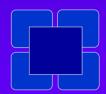
Optical Coherence Domain Reflectometry in Brain Probes

David Huang, MD, PhD Mark Shure, PhD Ken Baker, PhD Ali Rezai, MD

THE CLEVELAND CLINIC



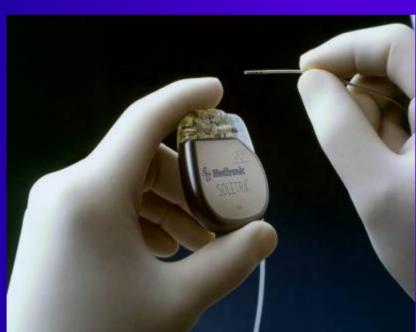
Supported by NIH/NIBIB R21 EB002718

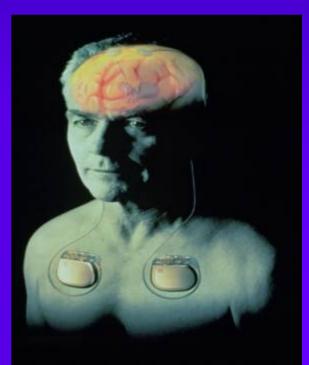
Deep Brain Stimulation (DBS) Brain Pacemakers

FDA approved indications for Parkinson's disease Tremor Dystonia

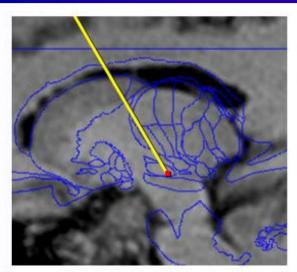
>25,000 implants to date Reimbursed by Medicare and insurance in all states

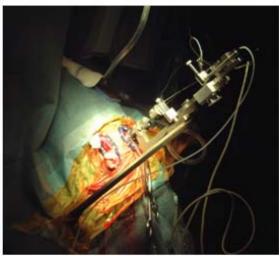


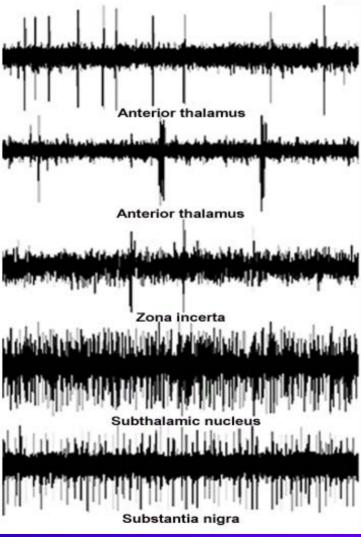




Implantation of Deep Brain Probe



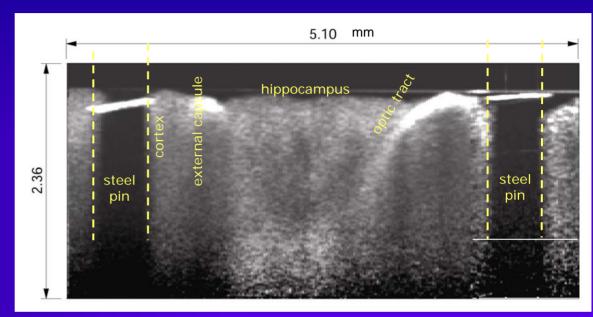




- Planning by MRI with brain atlas registration
- Stereotactic brain probe insertion guided by microelectrode recording
- Multiple insertion passes needed
- Blood vessel penetration & hemorrhagic stroke is a possible complication
- Additional intraoperative guidance mechanism needed

Preliminary Results: OCT of Rat Brain in vitro

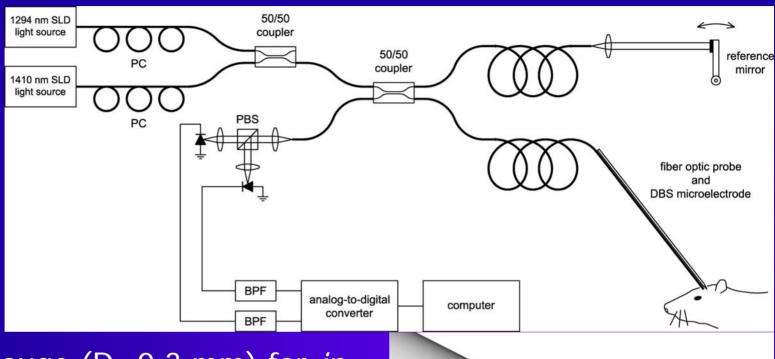
- White matter tracts (axons) distinguishable from gray matter
- Greater scattering
- Higher signal
- Faster attenuation







OCDR Brain Probe Design



- 30 gauge (D=0.3 mm) for *in vivo* rat experiments
- 1.3/1.4 mm dual wavelength hydration measurement
- Doppler blood flow detection
- Polarization-insensitive detection

